NEW CYTHEROMATID OSTRACODA FROM THE CENOZOIC OF NEW ZEALAND

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ABSTRACT

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Three new species of cytheromatid Ostracoda (*Pellucistoma coombsi*, *Pellucistoma fordycei* and *Paracytheroma stilwelli*) are described from Late Eocene and latest Oligocene to Early Miocene marine sediments of the South Island, New Zealand. *P. coombsi* is also known to occur in Recent marine sediments, at outer shelf depths, off the Westland coast. All three species are apparently endemic to New Zealand. These findings represent the first record of the Cytheromatidae in the New Zealand region, and also extend the known range for the family back to the Late Eocene.

KEYWORDS: Ostracoda - Cenozoic - New Zealand - Cytheromatidae - fossil - new taxa.

INTRODUCTION

There exist in New Zealand an extremely large number of ostracod taxa that await formal description. To date the number of taxonomic studies of Recent marine ostracods of New Zealand is small and include those of Brady (1880, 1898), Hornibrook (1952) and Swanson (1979a,b, 1980). Information about fossil marine species is provided by an even smaller number of studies, the most significant of which are the important works of Hornibrook (1952, 1953) and Swanson (1969).

The three species on which this paper is based were first encountered in a fossil sediment sample of Late Eocene age collected at an outcrop on the bank of the Waihao River, South Canterbury (Fig. 1). In that material, however, they are rare and rather poorly preserved. Recently the same species have been found well preserved, and in abundance, in samples collected from latest Oligocene to earliest Miocene (Waitakian) and Early Miocene (Altonian) marine deposits at All Day Bay, North Otago (Fig. 1). Thus there is now sufficient material to formally describe these species.

All three species are placed within the Cytheromatidae Elofson 1939, a family which has not previously been formally recorded from New Zealand.

MATERIALS AND METHODS

The ostracod specimens studied here were extracted from sediment samples of approximately 200 g dry weight using the methods described by Hornibrook *et al.* (1989). The species described in this paper were recovered from only the following localities and strata (and see Fig. 1):

(1) Bank outcrop near McCulloch's Bridge, Waihao River, South Canterbury. Longitude 170° 58.3′ E, latitude 44° 48.3′ S. Ashley Mudstone Formation. Age: Late Eocene, Kaiatan Stage, following correlation of Hornibrook *et al.* (1989). New Zealand fossil record number J40/f90. Map reference J40/497988 NZMS 260 (1975 overprint series).

(2) Coastal outcrop at northern end of All Day Bay, North Otago. Longitude 170° 53.2′ E, latitude 45° 11.8′ S. Gee Greensand Formation. For details of stratigraphy see Hornibrook (1982) and Fordyce *et al.* (1985). Age: latest Oligocene to earliest Miocene, Waitakian Stage, following correlation of Hornibrook *et al.* (1989). New Zealand fossil record number J42/f208.

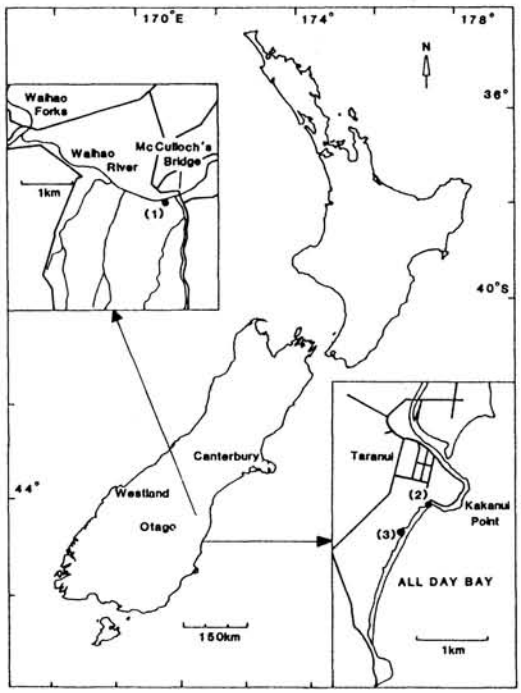

Figure 1. Map of New Zealand showing the positions of sample localities in the Waihao district (1: upper inset) and All Day Bay (2, 3: lower inset).

Map reference J42/445549 NZMS 260 (1975 overprint series).

(3) Coastal outcrop at All Day Bay, North Otago. Longitude 170° 53′ E, latitude 45° 12′ S. Riflebutts Formation (lateral equivalent of Tokama Siltstone, see Field & Browne (1986)). Age: Early Miocene, Altonian Stage, following correlation of Hornibrook *et al.* (1989). New Zealand fossil record number J42/f169. Map reference J42/442547 NZMS 260 (1975 overprint series).

Type specimens are deposited in the Museum collections of the Geology Department, University of Otago: the OU catalogue numbers apply to these. Topotypic specimens have been sent to the New Zealand Geological Survey, Lower Hutt.

SYSTEMATICS

Class Ostracoda Latreille 1806
Order Podocopida Müller 1894
Suborder Podocopina Sars 1866
Superfamily Cytheracea Baird 1850
Family Cytheromatidae Elofson 1939

GENUS *PELLUCISTOMA* CORYELL & FIELDS 1937

Remarks. *Pellucistoma*, a central American genus, is sometimes considered to be synonymous with the Indo-Pacific *Javanella* Kingma 1948. Neither *Pellucistoma* nor *Javanella* have previously been reported from New Zealand. Based on carapace morphology these genera appear to be the same, however, some differences have been noted recently in the appendages of the females (Howe & McKenzie 1989). Without further comparison of material from both sexes the distinction made so far has been inconclusive. Therefore, the earlier described genus is preferred here.

Pellucistoma coombsi n. sp. (Fig. 2 & 5A-D)

Derivation of name. For Professor D.S. Coombs in recognition of his position as Professor of Geology and Head of Department for 34 years in the Department of Geology, University of Otago.

Diagnosis. A subrectangular species of *Pellucistoma* characterised by its symmetrically convex anterior margin, its short caudal process at mid-height, and its adont hinge that, in the left valve, is supplemented by a prominent anti-slip tooth both anteriorly and posteriorly. It possesses a downturned anterior vestibule, and a conspicuous upward curved radial pore canal posteriorly.

Holotype. Adult left valve, OU 39585.

Material. 20 adult specimens.

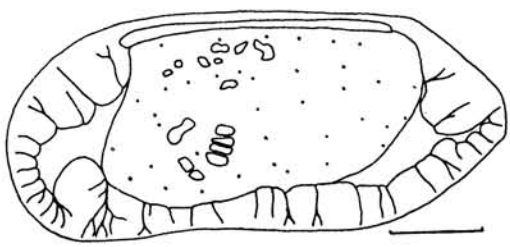

Figure 2. Camera lucida drawing of *Pellucistoma coombsi* n. sp. Holotype, OU 39585, left valve. Scale bar = 0.1 mm.

Type locality and Horizon. All Day Bay, North Otago. Longitude 170° 53' E, latitude 45° 12' S. New Zealand fossil record number J42/f169. Blue-grey siltstone of Riflebutts Formation. Early Miocene, Altonian Stage.

Description. Medium sized, subrectangular in lateral view with greatest height at posterior third and greatest length at mid-height. Anterior margin symmetrically convex; posterior margin with short caudal process at mid-height, concave above, slightly convex below. Dorsal margin straight, parallel to slightly concave ventral margin. Carapace weakly inflated. Left valve overlaps right valve dorsally. Surface smooth. Normal pores sieve-type. Hinge adont; in right valve, a strong smooth bar with bulbous anterior termination and a downward curved posterior end. Hinge in left valve a complementary groove with conspicuous anti-slip structures comprising a prominent lobate tooth anteriorly, and a smaller elongate tooth posteriorly. Adductor muscle scars a subvertical row of 4 scars; frontal scar single, large and dumb-bell shaped. Inner lamella wide with downturned anterior vestibule, and a moderately deep postero-ventral vestibule. Radial pore canals mostly long, some bifurcating; 14 anteriorly, 9 of which are short and closely adjacent along narrow portion of fused zone anteriorly; about 9 posteriorly, one being long, wide and upward curved at caudal process. Sexual dimorphism not apparent.

Dimensions (mm):

	Catalogue no.	Length	Height	Rec. No.
Holotype left valve	OU 39585	0.54	0.26	J42/f169
Paratype right valve	OU 39586	0.52	0.23	J42/f169
Paratype carapace	OU 39587	0.52	0.24	J42/f169
Paratype left valve	OU 39588	0.52	0.24	J42/f169

Remarks. This species is most similar to *P. caudata* (Hartmann 1978) from the Recent of Australia. However, in the latter the lateral outline is more ovate, the anterior margin is asymmetrical, the line of concrescence is less irregular, and there is no anti-slip hinge structure posteriorly. All other species of *Pellucistoma* differ from the present species in having a pyriform lateral outline.

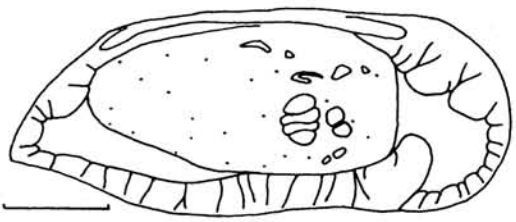

Figure 3. Camera lucida drawing of *Pellucistoma fordycei* n. sp. Holotype, OU 39589, right valve. Scale bar = 0.1 mm.

Pellucistoma fordycei n. sp. (Fig. 3 & 5E-G)

Derivation of name. For Dr. R.E. Fordyce in recognition of his work on fossil penguins and cetaceans.

Diagnosis. A subrectangular species of *Pellucistoma* characterised by its symmetrically convex anterior margin, downturned caudate posterior margin, and its mushroom-shaped anterior vestibule.

Holotype. Adult right valve, OU 39589.

Material. 10 adult specimens.

Type locality and Horizon. All Day Bay, North Otago. Longitude 170° 53' E, latitude 45° 12' S. New Zealand fossil record number J42/f169. Blue-grey siltstone of Riflebutts Formation. Early Miocene, Altonian Stage.

Description. Small sized, subrectangular in lateral view with greatest height at posterior third and greatest length just below mid-height. Anterior margin symmetrically convex, posterior margin caudate with downturned bluntly pointed apex below mid-height. Dorsal margin straight, ventral margin with shallow oral concavity and broad posterior concavity. Carapace weakly inflated. Right valve overlaps left valve dorsally. Surface smooth. Normal pores simple and evenly distributed. Hinge of right valve with long smooth groove and a small, weakly dentate, elongate tooth above shallow socket posteriorly; anti-slip bar inflated anteriorly and to a lesser extent posteriorly. Adductor muscle scars a subvertical row of 4 large, closely adjacent scars; frontal scar a large ovate scar rarely sutured medially. Inner lamella very wide with a large, downturned, mushroom-shaped vestibule anteriorly, and a

subtriangular vestibule postero-ventrally. Radial pore canals short, most simple except 2 long bifurcating canals antero-dorsally; about 13 anteriorly, 11 posteriorly. Sexual dimorphism not apparent.

Dimensions (mm):

	Catalogue no.	Length	Height	Rec. no.
Holotype right valve	OU 39589	0.45	0.21	J42/f169
Paratype carapace	OU 39590	0.54	0.23	J42/f208
Paratype right valve	OU 39591	0.50	0.22	J42/f169
Paratype right valve	OU 39592	0.50	0.21	J42/f169

Remarks. This species is easily distinguished from other species of *Pellucistoma* by virtue of its pointed, downturned posterior. It differs from *P. coombsi* also in its less well developed anti-slip teeth and the hinge groove being in the right valve.

GENUS *PARACYTHEROMA* JUDAY 1907

Remarks. *Paracytheroma* differs from *Pellucistoma* in lacking the strong terminal anti-slip hinge elements and caudal process of the latter genus.

Paracytheroma stilwelli n. sp. (Fig. 4 & 5H-L)

Derivation of name. For J.D. Stilwell in recognition of his work on fossil Mollusca of Antarctica and New Zealand.

Diagnosis. A cylindrical species of *Paracytheroma* characterised by its bluntly rounded posterior, distinct postero-dorsal angle, shallow oral incurvature, flanged postero-ventral margin, right over left valve dorsal overlap, and small dentate anti-slip tooth anteriorly.

Holotype. Adult left valve, OU 39593.

Material. 14 adult specimens.

Type locality and Horizon. All Day Bay, North Otago. Longitude 170° 53′ E, latitude 45° 12′ S. New Zealand fossil record number J42/f169. Blue-grey siltstone of Riflebutts Formation. Early Miocene, Altonian Stage.

Description. Small, cylindrical, with greatest height at posterior quarter and greatest length at mid-height. Anterior margin well-rounded, posterior margin more bluntly so. Dorsal margin slightly convex with distinct postero-ventral angle; ventral margin gently biconvex with shallow oral incurvature and, in left valve, bears a narrow flange along posterior half. Carapace moderately inflated, widest at posterior quarter. Right valve overlaps left valve dorsally. Surface smooth. Normal pores few and simple. Hinge of left valve consists of a long bar, swollen and weakly lobate anteriorly, narrow and curved posteriorly where it separates a shallow interior socket from a very narrow socket above. Right valve with complementary hinge elements and, in addition, an anti-slip dentate tooth anteriorly. Adductor muscle scars a subvertical row of 4, the upper 2 large and subtriangular; frontal scar large, ovate with an inclined anterior incision. Inner lamella very wide and vestibulate. Anterior vestibule broad with a ventral lobe; posterior vestibule narrow and crescentic. Radial pore canals short and simple, about 20 anteriorly, 9 posteriorly. Sexual dimorphism not apparent.

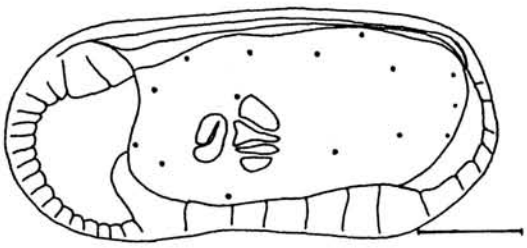

Figure 4. Camera lucida drawing of *Paracytheroma stilwelli* n. sp. Holotype, OU 39593, left valve. Scale bar = 0.1 mm.

Dimensions (mm):

	Catalogue no.	Length	Height	Rec. no.
Holotype left valve	OU 39593	0.46	0.22	J42/f169
Paratype right valve	OU 39594	0.47	0.22	J42/f169
Paratype carapace	OU 39595	0.48	0.25	J42/f169
Paratype carapace	OU 39596	0.46	0.25	J42/f169

Remarks. This species differs from all other species of the genus known to the author in having a postero-ventral flange, a distinct posterior cardinal angle and a dentate anti-slip tooth.

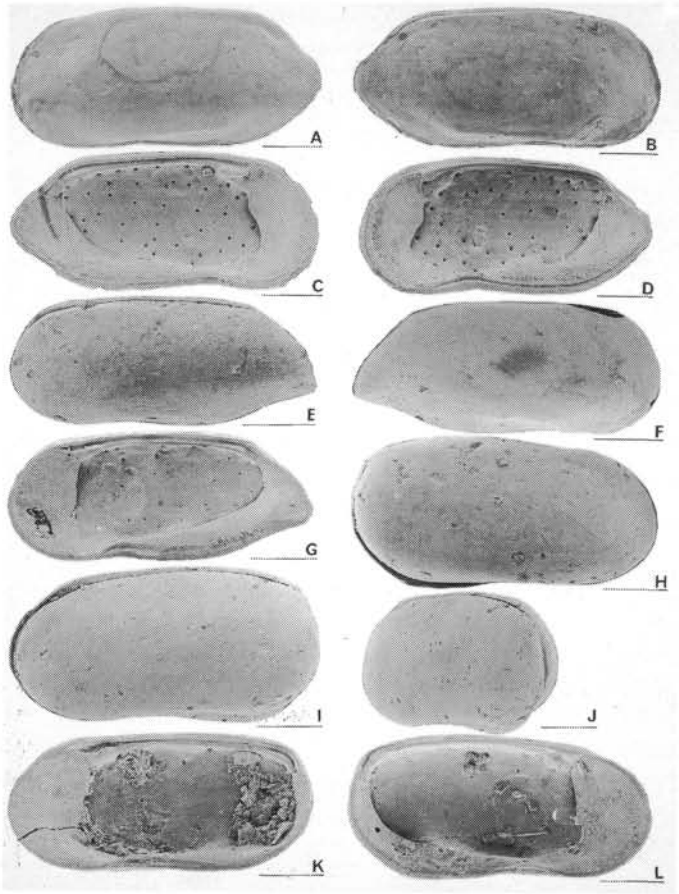

Figure 5. SEM micrographs. All scale bars = 0.1 mm. A-D. *Pellucistoma coombsi* n. sp.: A. holotype adult left valve, OU 39585, external lateral view; B. paratype adult carapace, OU 39587, external lateral view of right valve; C. holotype adult left valve, OU 39585, internal lateral view; D. paratype adult right valve, OU 39586, internal lateral view. E-G. *Pellucistoma fordycei* n. sp.: E. paratype adult carapace, OU 39590, external lateral view of left valve; F. paratype adult right valve, OU 39591, external lateral view; G. holotype adult right valve, OU 39589, internal lateral view. H-L. *Paracytheroma stilwelli* n. sp.: H. paratype adult carapace, OU 39595, external lateral view of right valve; I. paratype adult carapace, OU 39596, external lateral view of left valve; J. paratype adult carapace, OU 39596, external postero-lateral view; K. paratype adult right valve, OU 39594, internal lateral view; L. holotype adult left valve, OU 39593, internal lateral view.

DISCUSSION

DISTRIBUTION

All three species described herein were found in marine sediments of Late Eocene (Kaiatan Stage), latest Oligocene to earliest Miocene (Waitakian Stage) and Early Miocene (Altonian Stage) age. In addition one of the species, *Pellucistoma coombsi*, has been recorded from Recent sediments off the Westland coast, New Zealand (Swanson, pers. comm.). No records of these species exist outside the New Zealand region. To the author's knowledge the Cytheromatidae have not previously been found in sediments older than Oligocene.

PALAEOECOLOGY

Pellucistoma coombsi has been found in Recent sediments off the Westland coast at outer shelf depths (621-769 m). Although these Recent specimens lack soft parts (Swanson, pers. comm.) there is no other reason to suspect that they were not living at the same water depth in which they were found. The palaeodepth of the strata in which *P. coombsi* were found as fossil has been interpreted (from the associated macrofauna and sedimentary characteristics) as outer shelf to upper slope (Fordyce *et al.* 1985, Field & Browne 1986, Beu & Maxwell 1990). The Recent depth of occurrence of *P. coombsi* is therefore consistent with this interpretation, and suggests that its depth distribution has not changed greatly with time.

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